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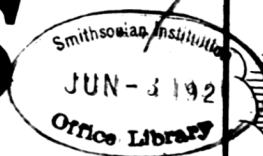
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CANADIAN -- AIR FORCE -- JOURNAL

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OBJECTS OF THE AERO CLUB

1. TO PROMOTE AND MAINTAIN A SOCIAL ORGANIZATION OR CLUB FOR THE ADVANCEMENT AND ENCOURAGEMENT OF VARIOUS FORMS OF AVIATION.
2. TO ADVANCE THE DEVELOPMENT OF THE SCIENCE OF AERONAUTICS AND ITS PRACTICAL APPLICATION.
3. TO ENCOURAGE AND ASSIST THOSE DESIROUS OF TAKING UP AVIATION WITH A VIEW OF RENDERING SERVICE TO KING AND COUNTRY.

OBJECT NO. 1

Club quarters are being maintained, including lounge, billiards, cardroom and lunchroom.

* Until further notice the Clubrooms are open daily from 9 A.M. to 6 P.M. except Sundays and public holidays.

* Meals are served daily to members and their guests.

* THE DIRECTORS ARE NOW CONSIDERING PROPOSITIONS FOR MORE ADEQUATE QUARTERS IN WHICH IT IS HOPED TO PROVIDE BEDROOM ACCOMMODATION FOR VISITING MEMBERS.

* As soon as deemed advisable and practicable, the Club will endeavour to maintain and operate an airharbor and suitable aircraft for the use of members, or to make suitable arrangements with an existing concern.

* Out-of-town members are invited to write in to the club on any matters in which the Club can reasonably render personal service for members.

OBJECT NO. 2

Ways and means are being provided for making the Club a clearing house and information bureau on matters of aeronautical interest.

* Members and others are invited to correspond with the Club—especially those who are engaged in commercial aviation, or are in a position to teach flying.

* Owners of aircraft open for contract work are invited to register with the Club. Full information with regard to equipment and terms should be given.

* It is desired to obtain costs of operation in order that reliable data may be compiled for the use of members and aviation interests.

OBJECT NO. 3

The Club is in favour of the Government maintaining an Air Force on adequate and economical lines consistent with the considered opinions, as to organization, of those competent to advise.

* The Club will use its influence and organization in encouraging the youth of our country to engage in aeronautical work for the development of our commerce and natural resources, and for service to the Empire when necessary.

MEMBERSHIP

Membership is open to Officers of the Canadian Air Force, Officers and Cadets of the Royal Air Force, and other branches of the Canadian and Imperial United Services; also to civilians wishing to take up or become interested in aviation generally. Apply to the Secretary for terms of membership and application forms.

Membership carries privileges of visiting membership in all Aero Clubs throughout the world affiliated with the Federation Aeronautique Internationale.

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ADAM F. PENTON, Publisher.

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Volume 4.

TORONTO, MAY, 1921.

No. 3

Canadian Air Board Report for the Year 1920

The Air Board was reorganized by Order in Council No. 826, dated April 19, 1920.

The original board having completed the preliminary work of organization for which it was appointed, resigned, and a new board was appointed in its stead under the chairmanship of the Hon. Hugh Guthrie. Col. O. M. Biggar was reappointed vice-chairman, and the heads of the flying and administrative services of the board (Air Vice-Marshal Sir W. Gwatkin, Inspector General of the Canadian Air Force; Lt.-Col. R. Leckie, Director of Flying Operations, and Lt.-Col. J. S. Scott, Controller of Civil Aviation) were made members. Capt. W. Hose, Director of the Naval Service, and Dr. E. Deville, Surveyor-General of Canada, were appointed to the remaining vacancies.

The position of secretary became vacant at the same time through the resignation of Major A. M. Shook, on account of ill-health. Mr. J. A. Wilson, Assistant Deputy Minister of the Naval Service, and member of the original board, was appointed to this vacancy.

During the year board meetings have been held as necessary. In addition a departmental committee, consisting of four members of the board (the vice-chairman, the inspector-general, the director of flying operations, and the controller of civil aviation), together with the Secretary, the air officer commanding the Canadian Air Force, and the heads of the technical and equipment branches, has met regularly since its formation on August 21.

The board exists for three purposes:

1. The regulation of civil aviation.
2. The conduct of civil government operations.
3. The air defence of Canada, including the organization and administration of the Canadian Air Force.

Accordingly there are three main divisions — each of them controlled and directed by an adequate and efficient staff; and to minister to their common requirements there has been established a departmental organization which serves to prevent overlapping and a duplication of work.

International Convention

The international convention for air navigation, agreed upon by the representatives of the powers on the International Commission on Aerial Navigation, constituted as a sub-commission of the peace conference in Paris, has been the subject of study during the year. A reservation to article 5 of the convention, reserving Canada's right to make reciprocal arrangements with the United States of America for the regulation of international flying, in the event of that country not becoming a party to the convention, has been proposed. In addition, further reservations to the technical annexes of the convention are considered necessary by the Air Board. These have been put forward with a view to ensuring a better licensing system and more clearly defining certain clauses of these annexes. These changes have been incorporated in the Canadian

Air Regulations, which, therefore, do not wholly conform to the convention.

It is anticipated that the convention will be ratified with the reservation on article 5, mentioned above, on the understanding that the technical points raised will be dealt with by the commission after ratification.

Controller of Civil Aviation's Branch

This branch is charged with the regulation of commercial aviation; the examination of machines and their certification for airworthiness; the licensing of pilots, navigators and air engineers; the licensing of aerodromes; the survey of air routes; inquiry into the cause of accidents; and other work of a similar nature to ensure the proper conduct of commercial and civil aviation generally, and to render assistance and encouragement as necessary. The following table shows the certificates issued during the year:

Type of Certificate—	Applications received	Issued	
		Temporary Certificates*	Permanent Certificates
Private Air Pilots	60	3	53
Commercial Air Pilots	142	83	78
Air Engineers	111	80	66
Air Navigators	2	1	
Registration of Aircraft	142	79	111
Air Harbor Licenses	47	38	16
	504	284	324

* Granted pending issue of permanent certificates, when temporary certificates automatically lapse.

Preliminary surveys with a view to the establishment of air routes throughout the country have been undertaken between Calgary and Vancouver, and between Sudbury and Winnipeg. These districts are the most difficult on the transcontinental route, and will require special attention if a transcontinental route for regular flying is to be established. An officer of the branch was detailed to assist the United States Army air advance party on their New York-Nome (Alaska) expedition, and to obtain information on that part of the route lying within Canada. As opportunity has offered, much work has been done in locating the best routes for air travel by both land and water machines throughout the country.

3,300 miles of routes surveyed for landplanes and flown over.

2,350 miles of routes surveyed for seaplanes and flown over.

1,700 miles of preliminary survey of aerial routes.

The establishment of municipal aerodromes has been encouraged as much as possible. Spare Bessoneau hangars have been lent to the Canadian Division of the Aerial League of the British Empire, Montreal, and to the town of Virten, Man.

With a view to determining the causes of accidents occurring in civil aviation, courts of inquiry are held on all serious cases. During the year eight courts have been held.

Civil aviation, though still in its infancy in this country, has made considerable progress during the year. The following statistics show the flying done and the accidents reported:

Statistical Summary of Civil Aviation in Canada, 1920

Number of firms engaged chiefly in manufacturing aircraft	1
Number of firms engaged chiefly in jobbing aircraft	2

Number of firms engaged chiefly in operating aircraft	30
Number of firms employing aircraft as auxiliary service	3
Number of machine flights made	18,671
Number of machine hours flown	6,505
Approximate machine mileage	422,462
Average duration of each flight in minutes	21
Number of passengers carried	15,265
Approximate passenger hours flown	5,164
Total freight carried (pounds)	6,740

	Pilot or m/c	Pilot and m/c
	Uncertified	Certified
Number of accidents resulting in death to one or more occupants of machine	2	3
Number of nonfatal accidents resulting in injury to occupants of machine	2	2
Number of accidents resulting in death of third party (occupants of m/c uninjured)	0	0
Number of accidents in which no one was killed or injured	1	4
Total accidents reported	5	9
Approximate number of machine miles per accident		30,176
Approximate number of machine flights per accident		1,334
Approximate number of machine hours per accident		465
Pilots killed per 1,000 flights made by pilots		0.54
Pilots killed per 1,000 hours flown by pilots		1.54
Passengers killed per 1,000 passengers carried		2.66
Passengers killed per 1,000 hours flown by passengers		7.55

Civil Government Flying, 1920

Number of flights made	398
Number of hours flown	480.10
Approximate mileage	33,612
Number of accidents (three slight crashes only)	0
Number of personnel killed	0
Number of personnel injured (slightly)	1

The Air Regulations, 1920, approved by the Governor in Council on Dec. 31, 1919 and taking effect on January 17th, 1920, have proved completely satisfactory in practice and sufficient for the control of civil aviation in the Dominion. Modifications for the prevention of dangerous flying by pilots carrying passengers were passed at the tenth meeting of the board, held on June 21, and were subsequently ratified by Order in Council. These were found necessary, as the majority of the few accidents occurring were caused by this practice, which is now made illegal and punishable by law.

Pending action by the United States government to pass legislation putting into effect the provisions of the international air navigation convention, temporary provision was made for the entry into Canada of United States aircraft and pilots under regulations which placed them in the same position, for the time being, as if the United States had passed legislation similar to that existing in Canada: that is, properly qualified military pilots and machines certified as airworthy, of United States nationality, were

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permitted to fly in Canada but not to carry passengers or goods for hire between points in Canada.

Civil Operations Branch

This branch is charged with the conduct of all flying operations for the government, except those connected with the defence of Canada.

In November and December of 1919 a preliminary survey of Canada was made with a view of ascertaining what public services could be more efficiently performed by air than by existing methods. An inter-departmental conference was held in January, 1920, for the discussion of the situation with officers of the various services interested. As a result of that conference, operations based on Vancouver, B.C.; Morley, Alta.; Ottawa, and Roberval, P.Q., were decided on, and plans were made for their execution.

As the Air Board estimates were not passed until the beginning of July, no funds were available for any operations before that date, and no active preparations could be undertaken in the field. Work was hastened, however, directly funds were voted, and the following statements show the progress made:

VANCOUVER, B.C.

The establishment of this station was authorized by the board on Feb. 14, and by Order in Council No. P.C. 435, dated May 15, 1920.

Work for the Provincial as well as the Dominion Government will be undertaken. The Provincial Government has provided, free of charge, a suitable seaplane station site on English Bay, in the municipality of Point Grey, and is prepared to defray a substantial part of the cost of the operations.

The services to be undertaken include forest protection and survey, transportation work to inaccessible districts, photographic surveys and fishery patrols.

The erection of the station has been undertaken under direction of the Department of Public Works, and considerable progress has been made. So far only temporary hangars have been erected; but it is anticipated that permanent structures will be built in time for use during

1921. The ground work was far enough advanced by the end of August to permit of the erection of an HS-2-L flying boat, and a trial flight was made Sept. 22. Experimental flights were carried out during October to gain familiarity with conditions and test thoroughly the suitability of the equipment. In November a series of flights took place in the interior of British Columbia; they were based on Sicamous and Kamloops, with a view to determining the flying conditions in that district. The heartiest co-operation has been given by the officers of other government departments, Dominion and Provincial, and those who have taken part in the demonstration have expressed themselves fully satisfied that the use of aircraft will increase the efficiency of their services and render possible much work which cannot be undertaken to advantage at present. Preparations are now being made for carrying out a full programme of regular services during 1921.

MORLEY, ALTA.

The main purpose served by this station is the provision of better fire protection in the Dominion Government forest reserve on the eastern slopes of the Rocky Mountains, from the international boundary north to the Yellowhead Pass. The havoc caused by forest fires has been great and if better control can be obtained from the air, the expense of the operations will be amply justified. The forestry branch of the Department of the Interior are greatly interested in the work and have given the closest co-operation.

An aerodrome site in the Bow Valley, on the Indian reserve at Morley, was chosen as a base. A Bessoneau hangar was erected in August, and patrols were maintained throughout September and October with excellent results. DH-9a and Avro machines were used. The high speed and reserve power of the former are very valuable in that district, as strong winds are very prevalent and less powerful machines cannot make headway against them. With the co-operation of the radiotelegraph branch of the Department of Naval Service a wireless service between machines on patrol and the base was established. Though the season of greatest fire hazard was over before flying commenced, many fires were reported, and full information as to their exact location, extent and progress was supplied to the forestry authorities.

The superintendent of Dominion parks and the forestry officers of the Commission of Conservation, as well as the chief of the Forestry branch, have expressed themselves fully satisfied with the results obtained by the introduction of the air patrol; they have asked that the service be extended, and that additional patrols be employed next year.

Arrangements are therefore being made, subject to approval of the estimates for the financial year 1920-21, for more extensive operations next season. These contemplate the division of the patrol into two sections—a southern, based on High River, and a northern, based on Eckville.

ROBerval, QUE.

This operation was undertaken at the request of the Province of Quebec. It was established as an experi-

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TORONTO, ONT.

ment to show the value of aircraft in forest patrol and survey, and to facilitate the exploration of the forest areas north and west of Lake St. John. The Forestry officers of the Quebec Government have shown the keenest interest in the experiment, and their co-operation has ensured its success.

The free use of a suitable site on the shores of Lake St. John at Roberval, was given by the courtesy of Lt.-Col. B. A. Scott, of Quebec. Buildings and a slipway were erected by the Provincial Government. Two HS-2L machines were flown from Halifax to the station, arriving on July 19. Flying continued uninterruptedly until the end of October, when winter put an end to the work for the season. The work was carried out under the direction of the Provincial Department of Lands and Forests. Many reconnaissance trips were made; caches were established to allow of patrols being pushed further afield in future; and photographic surveys were made of the main river courses in the district.

The provincial authorities have expressed themselves as being fully satisfied with the results of the experiment and have asked for its continuance and extension next season. They are prepared to increase their expenditure on the

work considerably, and wish the patrol extended to Lake Mistassini and, if possible, to the shores of James Bay. The total flying time from the station was 73 hours. No accident to personnel or machines occurred.

OTTAWA, ONT.

The great development of aerial photography during the war, and the manifest advantages its perfection would bring to many classes of surveying, has been a subject of great interest to surveyors in Canada. Photo-topographic methods of surveying have been developed to a great extent in Canada, and it is felt that the development of aerial photography may lead to still further advances in this science.

In 1919 an aerial survey committee consisting of representatives of the various surveying departments of the Government was formed to consider this subject. The co-operation of the Air Board in a practical experiment was requested. It was decided that Ottawa would be the most favorable location for carrying out the test, as the terrain was varied and provided areas of land and water with varying elevations in a small district. Arrangements were made with the Department of Militia and Defence for the use of vacant land in the danger area behind the butts at Rockcliffe range for use as an aerodrome. Much experimental work was done with various types of machines and cameras under different flying conditions. The survey work was performed under the supervision of the chairman of the aerial survey committee, Dr. Deville, the Surveyor-General, who is also a member of the Air Board. The field work and actual operations were carried out by Mr. F. H. Lambart, D.L.S., an officer with long experience in photo-topography. A report on this work has been made and has created much interest in engineering circles; and it is considered that with the development of improved cameras methods of aerial surveying which will be of very great importance may in the near future be evolved.

In addition to this work, the station at Ottawa was used as a base for minor operations in different parts of the country, and as a communication and demonstration station. Continuous flying was carried out until the middle of November, when operations ceased for the winter.

A total of 91 hours and 30 minutes flying was done on many types of land and water machines.

The Ottawa River provided perfect facilities for the seaplanes and flying boats. No accident of any kind occurred during the season's work.

HAILEYBURY, ONT.

Towards the end of August the Department of Agriculture and the Commission of Conservation asked for the co-operation of the Air Board in an experimental operation to determine the use of aircraft in the survey of forest country affected by ravages of insect pests.

During September a machine with pilot and mechanic was detailed from the Ottawa station and flown to Haileybury for this work. A mooring-out station was established on Lake Temiskaming, and operations were continued for fourteen days. In this time a complete survey of forest conditions was made over a large territory, and the Forestry and entomological officers engaged in the work reported that during the eighteen hours' flying they had been able to obtain more information than they could have done in several months' groundwork. On completion of the operation the machine was returned to Ottawa.

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CAMP BORDEN, ONT.

The equipment and machines which, after the Armistice were presented to Canada by the Imperial Government, were shipped to Borden, where during the year the erection and testing of all machines was carried out by the operations branch.

This work, also the management of the engine and aircraft repair shops, was transferred to the technical branch at the end of the year.

During the year the following machines were erected and tested at Camp Borden: 17 Avros, 8 DH 9A, 1 Bristol Fighter, 5 SE 5A, 4 DH 4.

HALIFAX, N.S.

The naval air stations established during the war at Halifax and North Sydney by the Department of the Naval Service were transferred to the Air Board during the year, with all aircraft, equipment and material on the stations. As the expense of maintaining two stations on the Atlantic coast was not justified, it was decided that the base at North Sydney should be closed, and that the material there should be transferred to Halifax or other stations where it was required for immediate use. This work was completed during the summer.

Halifax station has been maintained as an operations branch station for the erection and repair of seaplanes. As this station is open all the year round, it provides an ideal location for this purpose. Air routes suitable for water-type machines lead to all parts of eastern and central Canada. Machines required for operations as far west as Winnipeg can be flown from Halifax in the spring, and back to their base in the fall, for overhaul and repair, before ice forms in these districts. This station also provides a base for combined training with the naval service and the local garrison.

Canadian Air Force

The formation of the Canadian Air Force was approved by Order in Council No. 395, dated Feb. 18, 1920. After reviewing the general situation in regard to military aeronautics, the order points out that as war strength in the air must ultimately depend on civil or commercial aviation, war formations, under present conditions, should exist on paper, and not in the form of embodied units, and that training for war, should be periodic, intensive and widespread. For this reason it authorizes the formation of the Air Force on a non-professional basis, and makes provision for the training of the great bulk of the flying and ground personnel for one month every two years. It recognizes, however, that for the proper organization of the staff and for instructional work a longer period of duty is necessary. The employment of officers and men for such duties for a period of not more than one year is therefore permitted.

On April 23, Major-Gen. W. G. Gwatkin, formerly chief of the General Staff, Canadian Militia, was appointed inspector-general of the Canadian Air Force, with the rank of Air Vice-Marshal; and on May 17, Air Commodore A. K. Tylee, O.B.E., appointed air officer commanding for a period of nine months.

A call to officers and men who had served in the flying services during the war was issued and met with a gratifying response.

A provisional establishment of 1,340 officers and 3,905 airmen was authorized by Council on June 30; and a small

headquarters staff for general administration was then appointed, and an advance party sent to Camp Borden July 5.

Camp Borden was transferred from the Department of Militia and Defence to the Air Board for use as a training centre early in July. The regulations of the C. A. F. were approved on Aug. 31, and No. 1 Wing was formed at Camp Borden on Sept. 7. This comprises the following units:

1. School of special flying—Avro training machines.
2. No. 1 Squadron—
 - (a) One flight of flying scouts (SE-5).
 - (b) One flight of bombing machines (DH 9A), and night-flying training.
3. Ground Instructional School—
 - (a) Engine repair section.
 - (b) Aircraft repair section.
 - (c) Radiotelegraphy.
 - (d) Photography.
 - (e) Gunnery.
 - (f) Navigation.
4. Equipment Branch—Technical, non-technical, quartermaster's stores, and motor transport.
5. Victualing Branch.
6. Medical Branch.
7. Camp Maintenance (civilian employees only).

Camp Borden is one of the finest flying grounds in existence. Training will be continued all the year round. No difficulty has been experienced in maintaining the work during the winter months. On the contrary, it is expected that the camp will continue to be busier in winter than in summer, as many pilots and mechanics will find it more convenient to take their training in winter, when commercial work is usually less.

During October, November and December 86 officers and 111 airmen completed courses in training. On Dec. 31 50 officers and 209 men were in training, making a total for the first three months' work of the C. A. F. of 456 officers and airmen trained or in training. The general average time in the air of each pilot taking the course was 6 hours and 6 minutes, and the total flying time was 934 hours and 15 minutes. No accident of any nature requiring medical assistance has occurred during this time.

Employers of labor are co-operating readily with the Air Board and assisting the work by allowing employees leave to take their training.

Aviation companies and commercial pilots are finding the Air Force training of great benefit in providing schools of instruction in all matters relating to flying. Men are given every assistance and encouragement to increase their efficiency, with consequent benefit to themselves, their employers, and the public generally.

As Camp Borden has no facilities for flying water machines, arrangements have been made for attachment of flying officers to the civil operations branch station at Vancouver or Halifax, for short periods of instruction in the handling of seaplanes.

Co-operation with the Naval Service, the Militia Department, and the Royal Canadian Mounted Police has been secured, and is maintained, through the medium of the defence committee, on which the inspector-general represents the Air Board. Attention has been given to general questions relating to measures of defence, plans for combined training have been considered, and arrangements are being made for the execution of tactical schemes in



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which the three services—navy, militia and air force—are intended to take part.

For purposes of liaison officers of the C. A. F. are attached, each for a period of six months, to the Air Ministry in London; and so far as is practicable, the C. A. F. will be trained and equipped in the same manner as the Royal Air Force.

The Canadian Air Force Association

Under the authority of the Order in Council already cited a Canadian Air Force Association has been formed.

Nova Scotia, New Brunswick and Prince Edward Island excepted, there is in each province a branch, of which the Lieutenant-Governor has been good enough to consent to act as honorary president; and for each provincial branch there is an executive committee consisting of seven members who serve, normally, for two years; four of them (representing the Canadian Air Force) are elected and three are nominated by the Lieutenant-Governor.

For the Maritime Provinces there is but one provincial branch, and its executive committee varies in this respect, that the three Lieutenant-Governors nominate one member each.

The special duties of executive committees are to keep rosters of officers and airmen, to detail them for duty and training, and generally to take such action as is directed for the recruitment, administration and mobilization of the Canadian Air Force.

To each executive committee is made a grant sufficient to defray office expenses and to remunerate a secretary.

The constitution of the several executive committees is as follows:—

Alberta—His Honor R. G. Brett (chairman), Flight Lieut. R. F. McCall, D.S.O., M.C., D.F.C., C.A.F. (vice-chairman); A. H. Clarke, Esq.; W. A. R. Kerr, M., Ph. D.; Major D. A. MacRae, C.A.F.; Flying Officer C. W. Gorman, C.A.F.; Flying Officer H. W. Gee, C.A.F.

British Columbia—H. Bell-Irving, Esq. (chairman); E. V. Peters, Esq. (vice-chairman); N. A. Yarrow, Esq.; Squadron Leader R. H. B. Ker, C.A.F.; Squadron Leader A. M. Lester, C.A.F.; Flight Lieut. P. E. Beasley, C.A.F.; Flight Lieut. G. H. Stuart, C.A.F.

Manitoba—D. C. Coleman, Esq. (chairman); Flight Lieut. F. C. Mathers, C.A.F. (vice-chairman); C. F. Gray, Esq.; Major E. P. Featherstonhaugh, C.A.F.; Flight Lieut. J. H. Cathcart, C.A.F.; Flight Lieut. E. Spear, C.A.F.; Flight Lieut. V. Robinson, C.A.F.

Maritime Provinces—Flight Lieut. L. E. D. Stevens, C.A.F. (chairman); Flying Officer Barnhill, C.A.F. (vice-chairman); W. H. Denis, Esq.; A. E. Stephenson, Esq.; J. O. Hyndman, Esq.; Flying Officer F. S. E. MacRae, C.A.F.; Pilot Officer H. H. Whitlock, C.A.F.

Ontario—Lloyd Harris, Esq. (chairman); Lieut.-Col. R. W. Leonard, Sir John Aird, Squadron Leader D. Hallam, D.S.O., C.A.F.; Squadron Leader D. Joy, A.F.C., C.A.F.; Squadron Leader A. M. Shook, D.S.O., D.S.C., C.A.F.; Flight Lieut. A. J. Hember, C.A.F.

Quebec—Col J. A. Scott (chairman); E. Greenwood, Esq. (vice-chairman); A. Amyet, Esq.; Flight Lieut. F. McGill, C.A.F.; Flight Lieut. G. Hodgson, C.A.F.; Flight Lieut. G. G. Davidson, C.A.F.; Flight Lieut. C. T. F. Falkenberg, D.F.C., C.A.F.

Saskatchewan—Brig-Gen. G. S. Tuxford, C.B., C.M. G. (chairman); Capt. R. A. Delhay, D.F.C., C.A.F. (vice-chairman); Prof. A. R. Gray; J. Balfour, Esq.;

Flight Lieut. J. R. Hopkins, D.F.C., C.A.F.; Flight Lieut. J. B. Home-Hay, M.C., D.F.C., C.A.F.; Flying Officer A. H. E. Sumner, C.A.F.

Transcontinental Flight

The trans-Canada flight was undertaken as a joint operation between the three main branches of the Air Board. Its purpose was to demonstrate the possibility of such a flight and its feasibility as a commercial proposition; to test by actual experience whether the routes previously surveyed provided a practical line of communication between Halifax and Vancouver; and to encourage recruiting for the C.A.F., then commencing operations, and to stimulate the interest of the public in aviation generally.

The flight was undertaken under most adverse weather conditions. Notwithstanding this, it was safely accomplished. The difficulties encountered increased the value of the experience gained and showed that, even in unfavorable circumstances, long-distance flying by night and day was quite feasible in Canada.

The flight started from Halifax at 8 a.m. on the 7th October and ended at Vancouver at 11.40 a.m. on the 17th. The total flying time for the journey was 49 hours 7 minutes. The breakdown of one machine, and engine trouble on the eastern half of the route, accounted for the loss of about 24 hours' time; and the remaining days were lost in the mountains in British Columbia through snowstorms, fogs and low-lying clouds which completely filled the mountain valleys. It is interesting to note that two of the most difficult sections of the flight were flown with ease and without loss of time in the dark, under unfavorable weather conditions, and with absolutely no moon to assist. These sections lay between Fredericton and Riviere du Loup, and between Kenora and Winnipeg. The latter from Kenora up the Winnipeg River to Lake Winnipeg and down the Red River as far as Selkirk had never been flown over before. The experience gained proves that with sound ground organization and ereays of suitable machines a service could be undertaken which would run with a high percentage of regularity and with a time schedule which would average slightly over 40 hours for the trip from Halifax to Vancouver, and less for the return journey. The prevailing westerly winds would increase the average speed of the eastward flight and retard the western passage. This would be counterbalanced, in part, by difference in time of four hours between Halifax and Vancouver.

Scientific Research

The associate air research committee, under the honorary advisory council for scientific and industrial research, formed in February under the chairmanship of Prof. A. S. Eve, of McGill University, has been active during the year. Nine meetings have been held and a programme of research outlined. The intention is that this work shall be of the most practical nature and shall, in the first instance, be confined to the immediate problems peculiar to aviation in Canada, such as the operation of aircraft in low temperatures, the effect of Canadian climate on doped fabric, and other similar practical questions.

Grants for particular researches under the committee have been made to the extent of \$4,500, as follows:—

To Mr. Stanley Smith, of Edmonton, for work in connection with his experiments on the improvement of barograph diaphragms, \$500.

To Prof. Angus, University of Toronto, for the investigation of carburetor operation at low temperatures, \$3,000.

To Prof. Robb, University of Alberta, for the investigation of the operation of water-cooled engines in low temperatures, \$1,000; one engine, propeller and other gear to be issued free of charge from Air Board stores for this purpose.

Arrangements have also been made for the carrying out of experimental work required by the technical branch by Mr. J. R. Parkin, in the wind tunnel at Toronto University. Work is also being carried out by Prof. McKergo, of McGill University, on anti-freeze mixtures.

The members and associates of the committee have shown the greatest interest in the work, and have obtained much valuable information on many subjects of interest to the board.

Technical Branch

The necessity for a strong technical branch to undertake the engineering and scientific work of the board is apparent. Steps were taken in September to arrange with the Civil Service Commission for the appointment of a director of technical services.

An appointment was made by the commission towards the end of October. The board has been fortunate in securing for this position Lieut.-Col. E. W. Stedman, an officer of the widest experience in aeronautical engineering. A technical staff is being organized for the performance of these most important duties. It is clearly recognized that without the highest efficiency in this branch the flying services cannot operate successfully nor can the control of civil aviation be undertaken with satisfaction to the commercial firms engaged in operations or the aviation industry, or with advantage to the public generally.

The technical branch will not only undertake the conduct of the workshops and repair depots of the board, but will also advise the civil aviation branch in all technical matters connected with the certification of airworthiness of machines.

Meteorology

The arrangements made with Sir Frederick Stupart, director of the Meteorological Service, for co-operation in the extension of meteorology to meet the needs of aviation have been continued. During the year Mr. Paterson, of his staff, visited all Air Board stations and gave instruction in the use of pilot balloons for the measurement of the upper air currents. Daily observations were kept and the results forwarded to the head office in Toronto. Plans for the extension of this work and the publication in the press of flying forecasts are under consideration.

Medical Service

The air regulations call for the medical examination of all pilots licensed to fly in Canada every six months. This is necessary for the protection of the flying public. It ensures that only persons physically fit shall act as pilots of machines. A medical officer for these duties was appointed in December, 1919. On the formation of the C. A. F. another medical service was established for the examination of recruits and for the performance of medical duty at Borden when the camp was opened for training.

It was decided, however, by the board that the work could be more economically and efficiently performed by the combination of the civil and air force duties in a com-

mon service under a director of medical services. Arrangements were made accordingly, and Dr. W. H. Cronyn was appointed to the position.

The management of the hospital and other work at Camp Borden is under a resident medical officer of the Air Force. He also examines all applicants for certificates pertaining to civil aviation who wish to take their examinations while doing their C. A. F. training.

Arrangements have been made for the medical examination of recruits for the C. A. F. and applicants for civil certificates in the principal centres of Canada, at a stated fee, by qualified medical practitioners.

The dental service has been arranged for by the director of dental services, Department of Militia and Defence.

Supplies and apparatus required have been supplied on repayment, and in many cases free of charge, by the Department of Militia and Defence and Soldiers' Civil Re-establishment, to whom the thanks of the board are due for the ready assistance they have lent in this, as in many other matters.

Intelligence Branch

In February, 1920, Capt. F. C. Higgins, formerly in charge of the intelligence branch of the Canadian Air Force, C.E.F., was appointed aeronautical intelligence officer, and placed in charge of the intelligence branch of the Air Board.

The principal duties of the branch are to collect, classify and disseminate information regarding aeronautical developments. Every assistance has been rendered by the British Air Ministry. Intelligence is exchanged with other overseas dominions. Thanks to the courtesy of the American Air Service Department, much valuable information has been supplied from the United States.

A departmental library has been established with approximately 1,000 books, carefully selected, and it is hoped by making additions to this selection to establish in time a well-equipped aeronautical library, the use of which could be extended to members of the public interested in aviation.

The branch has been responsible throughout the year for the preparation and issue of periodical reports and statistics relating to the activities of the Air Board; the distribution to aviation companies, commercial pilots, air engineers, etc., of official notices, directions and announcements issued by the controller of civil aviation; and the supply of general and technical information to other government departments, at home and abroad, and, as far as possible, to individuals who seek to be enlightened.

Equipment Branch

The formation of an efficient organization to deal with the essential question of proper provision of the necessary supplies of material for the various services under the board was dealt with during the year.

Appointments have been made by the Civil Service Commission of equipment officers for headquarters and Camp Borden, and the staff necessary for the performance of these duties. Capt. H. C. Craig, A.M.E.I.C., late R.A.F., is in charge of this work.

It was decided to locate the main stores depot at Borden for the present, as accommodation was available, and all gift material was being shipped there from England.

Purchasing and store-keeping systems have been created for the provision, care, maintenance, receipt, issue and disposal of all material the property of the board.

Accountant's Branch

During the year a complete system for the proper control and accounting for expenditures and revenue has been built up. In May Mr. F. X. Talbot was transferred by the Civil Service Commission from the Department of the Naval Service to take charge of this branch. Cost accounting systems are being installed at all stations so that the board may be fully informed at all times of the cost of each and every operation. Information of great value to aviation generally as to the cost of flying, the maintenance of services, the depreciation charges on flying machines, and many other points will be made available through these accounts.

NOTICE TO AIR ENGINEERS re LAMINATED AND BUILT-UP SPARS

In all cases where aeroplanes have laminated or built-up spars, these are to be examined for opening up of glued joints. If a joint has only opened up an inch or two the spars should be bound with glued tape and varnished, but if the opening extends along the spar, or if there are several bad places on one spar, then that spar must be scrapped. This action has been necessitated by the fact that bad cases of this sort have been found on aeroplanes in service.

(Sgd) J. STANLEY SCOTT,
Controller of Civil Aviation.

May 9, 1921.

Presentation to Colonel Williams

Some men have fine flowers put on their last resting place and nice things uttered about them when they have crossed the great divide, but few men holding a position where it is necessary to enforce discipline have had greater tributes paid to them than was paid to Colonel J. Scott Williams recently at Camp Borden. Colonel Williams came in to dinner at the usual hour, and apparently everything was quite as usual. Soon, however, the second in command, Capt. N. R. Anderson, was seen to be acting strangely, and the C. O. must certainly have become alarmed when he saw that it was the intention of his right-hand supporter to make a speech, because whatever else he may be guilty of speech-making at dinner had not hitherto appeared on his crime sheet. But making a speech he was, and furthermore he was saying things about the C. O.

Soon the staff and other officers began to cheer and sing and Colonel Williams found himself being presented with a gift. In fact, there were two gifts. To show their great regard for their leader the officers had mingled

a little fun with the more earnest gift. Upon opening a case originally intended for a watch of great value Colonel Williams found inside an ordinary Ingersoll.

About the time that he was considering the whole thing a splendid joke and was joining with his comrades in their playful merriment he was presented with another watch in an ordinary case but with one fault, as he said, "Too good to use." It is the best that could be obtained.

Colonel Williams then realized that his coworkers had taken this opportunity to express to him the high esteem in which he is held by those who have worked under him and who knew of his sterling worth. It was to show him that they are glad he is remaining in command at Camp Borden and to assure him that he is their leader in the truest sense of the word, one whom they are pleased to follow, one whose motives they respect, one whom they look up to as a real genuine gentleman as true as steel to the cause, one whose decisions are without fear or favor, and one who is "a jolly good fellow" when the day's work is done and who sees that the day's work is done jolly well.

USEFUL TIPS TO SOLDIERS

By an old soldier, who served 21 years in clink and 19 in the canteen, and who never took the froth off a pint without making his third tunic button wet.

Whenever you are called hard names, do not take it to heart, even when the sergeant-major calls you "herring-gutted." He may mean it as a kindly inducement for you to take more pains in your Swedish drill.

Always take whatever comes your way with cheerfulness. If you should be ordered half a dozen number nines for an attack of the jim-jams, always remember that, although to-day you are in pain, to-morrow you will be right again.

Always bear in mind that the sergeant-major will be quite within his rights in protesting against any man who consorts with silk pyjamas with blue bebe ribbon insertions.

Remember that insect powder has its proper use; on no account should it be used during hot weather as a foot powder.

Don't start on a 20 mile route march without taking your usual thirst with you.

Last, but not least, always remember a soldier should

be truthful; and when, some time in the dim future, your grandchildren are gathered round your trembling knees and ask, "What did you do in the Great War, grandpa?" answer them truthfully and with pride say, "C.B. and Jack drill, my dears."

(Signed) "SWILL SWALLOW."

FRANCE

Report of French Aeroplane Industry

The French Chamber of Deputies has appropriated almost 300,000,000 francs for military and commercial aircraft development. Reports just released from the French Chamber of Deputies state: France possessed 120 aeroplanes of 14 different makes in 1914. There were in France at the time of the Armistice (owned by the French Government), 11,836 aeroplanes and 1,264 hydro-aeroplanes. There are at present 30,000 motors in France. The French Government produced 56,000 aeroplanes and 3,000 hydro-aeroplanes during the war. More than 100,000 motors were built. There are now more than 18,000 licensed air pilots in France. Just before the Armistice French factories were producing an average of 2,800 aeroplanes and 4,500 motors per month.

Canadian Air Force Activities at Camp Borden

ENTERTAINMENTS AT CAMP BORDEN

The entertainments during May have been better than any month so far this year. The motion pictures have been of a much higher grade on ordinary nights than heretofore. These are shown regularly three times a week. Several high-class extra pictures were also shown, one of which was the celebrated British film, "God and the Man."

The Musical Eckardts' concert party furnished a delightful entertainment in camp and had a good crowd to hear them. Their programme included Swiss bell ringers, vocalists, musicians, mimicry and "a ton of musical novelties."

Several concerts were held by camp talent, the one on May 11th being particularly fine.

SPORTS AT CAMP BORDEN

Sports have been organized throughout the camp in a very systematic manner among officers and men, and also among the resident ladies. Never before has such a harmonious spirit prevailed. Games are played every day and keen interest is manifested. It would take too much space to give even an outline of the games played, but a few will be especially mentioned elsewhere.

OFFICERS SPORTS COMMITTEE, CAMP BORDEN, C. A. F.

In order to facilitate sports among the officers at Camp Borden a special committee was appointed to make arrangements for the summer, as follows: Capt. Gandy, president; Flight Officer Doherty, secretary; Major Nivin, golf; Capt. Roodhouse, cricket; Capt. Duncan, baseball; Pilot Officer Cooper, tennis.

Col. Williams, Capt. Anderson and Capt. Tupper are members ex-officio by virtue of their offices.

TENNIS AT CAMP BORDEN

A successful tennis tournament was held at Camp Borden this month in which the following took part: Flight Officer W. C. Daniels, Capt. Duncan, Capt. N. A. Boulton, Pilot Officer Charlick, Flight Officer P. F. Gyles, Flight Officer O. B. Foss, Flight Officer E. B. Denison, Capt. N. R. Anderson, Pilot Officer J. B. Cooper, Flight Officer Norman, Pilot Officer J. M. Catto, Mr. J. P. Cunningham, Capt. Roodhouse, Major E. F. Nivin, Pilot Officer A. L. Morfee, Pilot Officer A. Tapping, Flight Officer J. R. Smith, Flight Officer S. T. Franke.

Games are played daily, and judging by the interest shown by the officers and their wives, Camp Borden should render a good account when outside games are arranged.

UNIFORMS FOR BASEBALL TEAM

Very fine uniforms have been secured for the Camp Borden baseball team. You should see them. This is the first team to be fitted with uniforms at Camp Borden but the committee hopes to do likewise for other teams soon.

CAMP BORDEN LIBRARY

The War Service Commission of the Church of England has given a grant of one hundred dollars to purchase books for the men's library at Camp Borden. A special deal has been made with a firm to supply books at wholesale price for this purpose.

MACHINE FOR PLEASURE ONLY

Camp Borden was recently visited by Mr. A. R. Roberts, of Green, Roberts and Company, Toronto. He came in his aeroplane, which he purchased in France last summer. It is a 23 meter Newport 2-seater, 80 h.p. Mr. Roberts has this machine for pleasure only and we are glad that he "dropped in" to see us on his way to Owen Sound.

MAJOR A. M. SHOOK RETURNS TO TORONTO

Major A. M. Shook, formerly secretary of the Air Board, and one of Canada's airmen who won many decorations overseas while an officer of the Royal Air Force, is home from Los Angeles, where he spent the winter in regaining his health. Major Shook is engaging in business in Toronto, it is understood.

Brig.-Gen. A. K. Tylee, first air commodore of the Canadian Air Force at Ottawa, has returned to Toronto after a sojourn in Boston and has decided to locate in Toronto, where he has engaged in business. General Tylee during his term as head of the Canadian Air Force became widely known for his efficiency as an officer and his executive and organizing ability.

Lieut.-Col. J. Scott Williams, in command of the Canadian Air Force at Camp Borden, was in Ottawa recently on official business.

Capt. J. F. Tupper, chaplain of the Canadian Air Force at Camp Borden, has made several flights to Toronto recently in connection with his various duties at the camp.

21ST AIRPLANE COMPANY JOINS M. A. A.

The Manufacturers Aircraft Association, 501 Fifth avenue, New York City, announces that the firm of G. Elias & Bro., Inc., of Buffalo, N.Y., has acquired membership in the organization. This is the twenty-first airplane company to join the association. Of this number sixteen are still active.

The house of G. Elias & Bro. was established as a partnership in 1881 and continued so until 1914, when the business was incorporated with a capital of \$500,000 and a surplus of \$20,000. In 1919 they established an aircraft department, and after two years of preliminary work began the actual manufacture of airplanes on contracts awarded them by the army and navy on their own designs.

CANADIAN CRAFT AT DAYTON, OHIO

Capt. E. W. Waller, C.A.F., received instructions to report to Dayton, Ohio, on May 15th, 1921, to test machines, etc., for the Spanish River Pulp and Paper Company there.

What's What in Sporting Circles at Camp Borden

By "GLESKA TAM"

Two hundred fans attended the opening of the baseball season at Camp Borden, and though they had to suffer the inconvenience of a late start, through Alliston missing their connection, they took it all in good part, thanks, no doubt, to the 12 to 8 win that Camp Borden put over their opponents.

It was a successful opening and recompensed Colonel Williams (who was present) for all he has done to elevate sport at Camp Borden, as all through the nine innings of the game he followed the play with keen interest and a satisfied smile which, to the casual observer, conveyed the impression that "All's well in baseball among the airmen at Camp Borden."

Camp Borden won the game because on the day's play they appeared the better ball team. In Banks of "A" Flight they had a pitcher who was a thorn in the flesh of Alliston by pitching steady ball throughout the game. Then they came through with hits at the right time, and with men on bases the runs were not long in mounting up. The whole team played as a combination, the fielding being without a flaw, especially at critical times when the least error might have meant the losing of the game.

Moore of Alliston pitched good ball, though he did get away badly in the first innings, when Camp Borden scored their initial three runs. After this inning he tightened up and the more corners he got into the better he appeared to be. He was not afraid to shoot the ball through the centre with runners on the bags.

Alliston tried to stage a rally in the sixth but Capt. Alguire passed the signal to the airmen to avoid a "flat spin" and "hold 'em down," in which Banks assisted by eliminating the side one-two-three. So thus ended a perfect game.

CAMP BORDEN

Banks, pitcher
Gould, 3rd base
Henderson, catcher
McLaughlan, c. f.
Redding, r. f.
Alguire, 2nd b.
Diamond, 1st b.
Gill, shortstop
Allan, l. f.
*Henderson

ALLISTON H. S.

Harper, 1st b.
Caesar, l. f.
Small, shortstop
Rose, catcher
Moore, pitcher
Thompson, 2nd b.
Wilson, 3rd b.
Hand, r. f.
Haddell, c. f.

THE TEAMS

Alliston	0	1	4	2	0	0	1	0	0	—	8
Camp Borden	3	5	0	0	2	1	1	0	0	—	12

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CAMP BORDEN NOT A FREE CIRCUS

No greater compliment has been paid to the management of affairs at Camp Borden than that which recently came from one whom I shall term a disgruntled unknown. This gentleman, who refrained from telling his name, while seated comfortably in a train a safe distance from any flying station, thought it an opportune time to complain to a fellow-passenger that he had not been given a flight at Camp Borden. He had condescended to visit the place and presumably had humbled himself to eat freely of the victuals there without money and without price, and it would also appear that he had allowed those in authority to permit him to wander about the premises unaccompanied by a special guard of honor. Nobody, however, patted him on the back and said "Bless 'is little heart," and nobody offered to place him absolutely in command of the station. I am sure that should he read this article he will realize that the latter was a mere oversight and will weep no more.

Camp Borden is a school of instruction for aviation. It may be that the disgruntled unknown did not know this. Anything that will serve to promote aviation is cheerfully done at Camp Borden, but surely the reasonable thinking people of Canada will agree that the time of instructors and machines intended for instructional purposes ought not to be given over indiscriminately to just anyone any old time.

Colonel Williams and his staff are to be congratulated. Tell it abroad. Shout it from the housetops that every Tom, Dick and Harry cannot visit Camp Borden and go for a flight, because the camp is properly and efficiently conducted as a training school where the time of instructors and machines cannot be used for the amusement of idle citizens or to the profit of adverse investigators.

"The Wasp"



RADIO

NEWS



BELL SYSTEM DESCRIBES USE OF RADIOPHONE IN ANNUAL REPORT

Much of the annual report of the American Telephone and Telegraph Company, just issued, is given to a description of progress made during the year in development and research, especially in the field of radio telephony. As the year closed it is stated more than 2,500 research and development projects were in hand, all designed to improve service and facilities. In 1930 two experimental radio telephone stations were erected on the Atlantic coast, one near Asbury Park and the other near Plymouth, and they have maintained communication with two experimentally equipped ships plying from Boston to South Atlantic coast ports.

Radio telephony is established, the report indicates. It will play an important part in establishing telephone communication with otherwise inaccessible places, and will make it possible for aircraft in flight and ships at sea to connect with the wires of the Bell system and thus hold conversation with any of its subscribers wherever located throughout the United States.

Development of wireless telephony for transoceanic use has progressed, it is added, since 1915, when such conversation was first made possible. As no means has been found of making submarine cables carry the voice for long distances, development work in this direction is continuing.

Inability to confine a wireless conversation to the stations immediately concerned is a factor which has interfered with the general utility of the radio telephone. By a method which enables a message to be automatically enciphered at the sending end and deciphered automatically at the receiving end in the form of printed words, this has been in a measure overcome, the ciphered words becoming an unintelligible jumble of sounds to stations not especially equipped to receive and decipher them.

This method is declared to be readily applicable to use in the sending of press dispatches and the like. For purely conversational purposes a similar system of coding and decoding has been developed which makes the receiving end hear only intelligible words, while eavesdropping stations get only confused unintelligible sounds. Development of this system, it is stated, is being continued.

ONTARIO RADIO ACTIVITIES

Mr. A. H. K. Russell, whose activities in radio operations is well known, is quoted recently in an exchange as follows:

"Citizen wireless in Ontario is much as usual, with progress slow but steady. Intercity traffic is increasing

and Toronto district is at last in touch with Brantford and Napanee. A new station in Peterboro gives us promise towards Ottawa, in Mr. Sherwood, 3MB.

"Caton (Napanee) is hoping to install a power CW set soon, and mentions communication by C. W. between Napanee, Kingston and Belleville. One-way traffic is at present carried on between 3FE and 3AB, Toronto.

"In Toronto a veritable epidemic of QRM has burst forth, and it is almost impossible to work through to American stations through the interference barrage. However, a fair number of messages have gone through via 8CG and 8ANJ. 3AB has established communication with 3BA in Brantford, and has been copied in Chatham by XEM, the training school station (which already has worked 8ZR and other stations to the south), on both C.W. and voice. William Gray in Chatham (3FM) has a DeForest 4-bulb transmitter with which he is doing good work. In Kitchener station 3DS is beginning to reach out, and is remodeling his aerial in the hope of making Toronto traffic regular. He has at present a one-way schedule with 1HAA, which has had good results, several messages having been forwarded in that way. Total messages 22."

RADIO RESEARCH CLUB FORMED

The formation of the Radio Research Club of Canada marked a decided advance in radio matters in Canada. The club was formed as a central body of Canadians interested in wireless. Among its members are the leaders in wireless as a commercial proposition as well as many of the leaders in various organizations for the radio amateur. The club was formed March 17th last, with the following officers: Honorary president, Prof. Rosbrugh; president, H. Galbraith; secretary-treasurer, Dr. Culver. Committee—W. C. C. Duncan, E. Bowers, C. R. Fraser, Capt. Gennet.

Meetings are held every third Thursday evening at temporary quarters in the new Physics Building at Toronto University. A course of lectures is being given, the first three of which are being delivered by Prof. Rosbrugh. Members are requested to bring their radio troubles to the meetings, as after the regular lecture time is devoted to a discussion of the various problems arising from time to time in the experiments of those interested in wireless.

Owing to a falling of the cliff it became necessary a short time ago to close temporarily the station at Port Burwell on Lake Erie. A building has now been erected on a new site a short distance away and the station is again open for communication.

RADIO RESEARCH CLUB MEETS FOR LECTURE

The Radio Research Club of Canada held a regular meeting at 7.30 p.m. May 19th, in room 23 of the Engineering Building at the University of Toronto.

The third lecture in the series on "Alternating Currents" was given by Prof. Rosebrugh. The lecture was followed by an interesting discussion. Time was also given for raising questions not directly connected with the lecture.

A report of the nomination ballot was made by the board of directors and will be reported in our June issue.

KINGSTON NOW HAS RADIO ASSOCIATION

Kingston, Ontario, has come to the front with a progressive wireless club, and a most successful association is looked for. At the first meeting the energies of all present were put into making rules and to drawing up the constitution and by-laws. After considerable discussion regarding the need of such a club in Kingston officers were elected as follows: Honorary president, Capt. S. A. Lee, M.C.; president, Orton H. Donnelly; vice-president, Robert M. Davis; secretary-treasurer, Staff Sergt. T. G. Brown; traffic managers, Harold Stewart and Gordon A. Thompson.

Traffic rules were also brought up and adopted and these are to be looked after by the traffic managers. All the members with transmitting sets are taking turns to transmit the Q.S.T. each evening at 7 o'clock. This Q.S.T. is sent out with the purpose of letting all amateurs know of any special news regarding the club, and also it affords practice for them. First transmission is at fifteen words per minute and the second at eight words per minute.

When the new clubrooms are made ready a transmitting and receiving set will be installed and operated by the association. Meetings are held every Friday evening at 7.30 and in the future there will be time for lectures by prominent radio men in Kingston. Altogether this will be a live-wire organization, as all the members are doing their best to make this one of the successful radio clubs of the country.

Code practice will also be taken up. There are about twenty-five members in the association. On account of the wave length which the government has in force, amateurs are compelled to transmit only on 50 meters, and all sets are tuned to this length.

Communications are solicited from other clubs. Will let you know later our call and all information regarding our set. Now boys, hold on till you hear our call careering through the ether and then listen in. This is going to be "some association."

NEW RECORD MADE IN CODE CONTEST

B. G. Seutter, an operator of the New York Times transatlantic radio receiving station, finished first in the code receiving test, and established a new record of 483-5 words a minute, with only two typographical errors, according to an exchange.

There were more than sixty contestants, including two of the most skillful operators from the Radio Corporation of America, a large delegation from the Western Union, a number from the navy's coastal stations and from the Independent Wireless Telegraph Company, as well as from other companies. The contest was an elimination

contest and started at 30 words a minute, which eliminated about one-third of the contestants.

It finally narrowed down to N. Bernstein, an instructor of the Western Union school, and Mr. Seutter, and three separate trials of two minutes each were necessary before the judges announced Mr. Seutter as the winner.

In recognition of his feat Mr. Seutter was presented with a silver loving cup.

Mr. Seutter's radio experience dates from 1913. During the world war he was in the United States navy and was stationed at Otter Cliff.

He was one of the navy operators specially assigned to receive confidential messages from the U.S.S. George Washington during her two trips to France and back with former President Wilson of the United States.

MARCONI HAS NEW WIRELESS FOG DEVICE

Discovery of a new wireless invention by which ships may be guided during dense fogs was announced in Liverpool by William Marconi at the annual British shipmasters' dinner.

This invention, he said, has not as yet been in operation anywhere, and is based on a principle by which electric waves may be directed in any definite direction like flashes from a lighthouse. He declared these waves would take the place of leading lights in thick weather, and would prevent collisions of vessels during fogs.

WRONG IMPRESSIONS AS TO CANADIAN WIRELESS

H. S. Gowan, 3DS of Kitchener, Ont., in sending out a press dispatch recently, made this interesting report:

An idea seems to prevail throughout the United States that the Canadian amateur is limited to 50 meters wavelength. Some are and some are not, as the quotation from the Radiotelegraph Act, part 2, paragraph 20, shown below, says:

"20. The wave-lengths which may be used vary with the distance between the licensed station and any commercial coast or land station or a route of navigation, as follows:

FOR TRANSMISSION

"Class 1—Stations located within five miles of a commercial coast or land station or a route of navigation shall not use a transmission wave-length greater than 50 meters.

"Class 2—Stations located more than five miles but less than 25 miles from a commercial coast or land station or a route of navigation, shall not use a transmitting wave-length greater than 100 meters.

"Class 3—Stations located more than 25 but less than 75 miles from a commercial coast or land station or route of navigation shall not use a transmitting wave-length greater than 150 meters.

"Class 4—Stations located more than 75 miles from a commercial coast or land station or route of navigation shall not use a transmitting wave-length greater than 200 meters.

"Maximum power, $\frac{1}{2}$ k.-w.; maximum decrement, 2."

During the season of closed navigation for the past two winters the government has given all amateurs permission to use 200 meters, to see how the amateurs tune their transmitters. If the amateurs will keep their waves sharp

enough to prevent QRM to the government stations, permission may be granted to all amateurs to operate on 200 the whole year around.

MEASURING DISTRIBUTED CAPACITY

It is now stated that high distributed capacity in coils is to be avoided, as it decreases the tuning range considerably and induces high resistance effects at resonant frequency. The last year has seen great improvement in coil design, so that coils with much lower capacity are available to the amateur. Most of the methods of measuring distributed capacity are dependent on the use of complicated formulae, or require precision instruments not ordinarily available to the amateur.

The following is a simple accurate method of making this measurement, and requires only simple apparatus:

1. Measure, or determine, the natural period of the coil. This is best accomplished by using an oscillator.
2. Shunt the coil with a calibrated variable capacity, and adjust until the natural period of wave-length is double.
3. Read the capacity value of the shunt variable.
4. Divide this reading by three to obtain the distributed capacity in microfarads.

Example: The natural period of a coil was found to be 100 meters. The capacity value of the shunt variable to make the natural period 200 meters was .00015 mf. This divided by 3 equals .00005 mf, the distributed capacity of the coil. The explanation of this is that the wave-length varies as the square root of the capacity. Therefore, to double the wave-length we must increase the capacity four times. Calling the unknown distributed capacity C_1 , and the calibrated shunt variable capacity C_2 , then

$$\begin{aligned} C_1 + C_2 &= 4C_1 \\ \text{Substituting, } C_1 + .00015 &= 4C_1 \\ .00015 &= 3C_1 \\ .00015 & \\ C_1 &= \frac{\quad}{3} = .00005 \text{ mf} \end{aligned}$$

NEW WIRELESS AUTOGRAPHIC MACHINE

For recording autographically radio signals from great distances a machine constructed on a different principle from the cumbersome apparatus now in use, has been completed and was demonstrated by Dr. E. A. Eckhard and Dr. J. C. Karcher of the Bureau of Standards. They have placed it in the same circuit and recorded with the same pen the ticks of a chronometer and the naval observatory time signals from Annapolis.

A chronographic recording drum pushes the paper past the chronograph pen at a uniform rate of speed and the signals are recorded as humps of the line, short humps for dots and longer ones for dashes. By winding the actuating magnets in different sections it is possible to record simultaneously the seconds of local time as furnished by a chronometer and compare them with standard wireless observatory time without the errors of "lag" of the instruments.

The machine was perfected in order to replace the present wire telegraphic ear recorded methods of making scientific time observations.

A NEW USE FOR THE BLIMP

Motion picture producers are always on the lookout for appliances and facilities that will assist them in obtaining new effects. Aeroplanes, submarines, diving bells, automobiles and other media have frequently carried a motion picture camera. Needless to state, some startling scenes have been obtained from their use.

The latest discovery in the art of taking "long shots" (fifty feet or more from camera) of action, particularly such action as is presented by large bodies of men, horses, cattle, etc., was recently introduced among West Coast film producers.

This discovery takes the form of a dirigible or "blimp" airship, in taking scenes from the ground, but never the blimp. The swiftness of the airplane makes it impossible to get any detailed action displayed by the individuals below.

With the blimp, however, travelling at a slow speed and, at times, standing almost still in the air, it is possible to take a sequence of actions performed by any group below.

WESTERN INTERESTS LOOK FOR LARGE AIRCRAFT

Mr. F. G. Ericson, president of Ericson Marine and Aircraft, Limited, 120 King Street East, Toronto, and who is also Canadian representative of the Aeromarine Sales and Engineering Corporation, was in New York May 12th, accompanied by Messrs. James G. Gibson of Edmonton, and Alan B. Taylor, of J. G. Beaty & Co., of Toronto, to select aeronautical equipment for the Great North Services, Limited. The party left New York at 10 a.m. May 12th in an aeromarine flying boat, and after passing the Narrows made a thirty-mile trip out over the Atlantic ocean. They later returned to the Aeromarine factory for refuelling and thence to the Columbia Yacht Club on North River, where they arrived at 3.30, and all expressed delight at the splendid aerial cruise and practical demonstration of the efficiency of the well-known Aeromarine type of flying boat.

The Aero Club of Buffalo is showing signs of increased activity. It is understood they held a very successful meeting on Saturday, May 14th. Mr. F. G. Ericson of Toronto was present.

RECENT GUESTS OF AERO CLUB OF CANADA

Numbered among the recent guests of the Aero Club of Canada at club headquarters, 34 Yonge street, were C. F. Redden, New York; Mr. and Mrs. Howard E. Coffin, Detroit; Dr. J. W. Inches, Detroit; J. G. Frankel, New York; J. R. Smith, New York; C. G. Frost, Toronto; K. W. Johnston, Sault Ste. Marie, Ont.; J. H. Barrowman, St. Catharines; Lieut. T. H. Spence, Regina; Capt. N. A. Bolton, London, Eng.; H. Thompson, Sault Ste. Marie, Ont.; Dr. C. O. Young, Sarnia, Ont.

A. C. OF C. ARENA MEET

The boxing bouts and other entertainment features staged at the Toronto Arena under the auspices of the Aero Club of Canada drew big crowds the night of May 20th, and the club is better off financially in the sum of \$500. The event was well attended by Canadian airmen and Toronto citizens.



WANTED, AND FOR SALE

Line advertisements under this heading 4 cents a word, minimum \$1.00.

Pilots seeking positions or companies wanting pilots will hit the nail on the head by advertising in this column.

If you have anything to sell advertise here.

Notices of meetings and propaganda work reaches the right people through this medium.

Through this column you are talking to your prospect direct.

Address Editor Aviation News, 60-62 Adelaide St. East, Toronto.

WANTED—Experienced O.X. 5 engine man and rigger. Holder of Air Engineer's Certificate preferred. State qualifications and salary expected. Address "Flying," Box 99, Sherbrooke, Que.

FOR SALE—Excellent passenger carrying or pleasure machine, Canadian J.N. 4, registered airworthy under Canadian Air Board. Complete with tools and \$200 worth of spares for \$2,000. Ready to fly at Sherbrooke, Que. Address "Flying," Box 99, Sherbrooke.

FOR SALE—Curtis JN-4, registered, perfect flying condition, fitted with sea floats and land undercarriage. Flown 30 minutes since overhauled. Delivery ex Chicoutimi Air Harbor. Price \$1,200.00 or best offer. Apply Aviation Dept., Price Bros. & Co., Ltd., Chicoutimi, P.Q.

"KEEP-A-GOING"

If you strike a thorn or rose,

Keep a-goin'!

If it hails or if it snows,

Keep a-goin'!

'Taint no use to sit and whine

When the fish ain't on your line;

Bait your hook an' keep a-tryin'—

Keep a-goin'!

When the weather kills your crop,

Keep a-goin'!

Though 'tis work to reach the top,

Keep a-goin'!

S'pos you're out o' every dime,

Gittin' broke ain't any crime;

Tell the world you're feelin' prime—

Keep a-goin'!

When it looks like all is up,

Keep a-goin'!

Drain the sweetness from the cup,

Keep a-goin'!

See the wild birds on the wing,

Hear the bells that sweetly ring,

When you feel like singin', sing—

Keep a-goin'!

— Frank L. Stanton.



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THE BALLAD OF A BRISTOL FIGHTER

There's a good half dozen busses
On which I have done a whack,
From the three ton weight to the R.E. 8
Of the lumbering old big fake.

On a rotary engine camel
I've manœuvred many a trick,
And oft in the past on a baby Nicup,
I have felt the feel of the stick.

And many a first rate joy ride
Have I had on them last and first,
And many a strut have I had go phut,
And many a wheel tire-burst.

But none of them knows the secret
Of making my heart rejoice,
Like a well-rigged Bristol Fighter,
With its two-six-five Rolls Royce.

She leans at her place on the Darmac
Like a tiger crouched for a spring,
From the arched spine of her fusilage line,
To the ample spread of her wing.

From her tail so staunchly fashioned,
To her tail skids' jaunty twist,
Her gray-cowled snout juts grimly out
Like a tight-clenched boxer's fist.

Is there a sweeter music,
A more contenting sound,
Than the purring clop of her broad curved prop,
As it gently ticks around?

Open her out rescendo
To a deep-toned swelling roar,
She gives and rocks as she strains at the chocks
And clamors amain to soar.

Whisk them away, my hearties,
Taxi her into the wind,
And off we go in a skimming run,
With her tail well up behind.

Hold her down to a hundred,
Then up in a climbing turn,
And off we go through the cloudless sky,
Till we catch our breath in the air, Alp high,
I wouldn't exchange my place, not, I,
For a thousand pounds to burn.

THE HIGHEST-LIFT WING IN THE WORLD—AN AMERICAN ACHIEVEMENT

Among the many problems confronting aeronautical engineers to-day there is one of paramount importance, namely, an aerofoil which will permit a wider speed variation to be obtained and will at the same time give a greater efficiency of loading per square foot of area.

Advances in the solution of this problem have been proffered by the Dayton Wright Company in its Variable Camber Wing, by the Parker Variable Camber Wing, by the Gastambide-Levasseur Variable Surface Aerofoil, and by the Handley-Page new High-lift Wing. Each of these four developments tends to solve the problem in different ways.

Recently The Glenn L. Martin Company, of Cleveland, designed an airplane wing which can lift a greater weight per square foot than any other known wing in the world. At thirty miles per hour speed, a model only eighteen by three inches in size carried four and two-thirds pounds per square foot. This is twice as great as the lift of the famous R.A.F. 15 wing, and 25% more than that of the Handley-Page wing according to the only record published. (In lbs., sq. ft., m.p.m. units $L_c=0.00516$.)

The efficiency of the Glenn L. Martin new high-lift wing at high speeds is claimed to be 10% to 15% greater than the highest value ever recorded for any wing except the Parker Variable Camber Aerofoil. It can not only carry great loads on planes of small dimensions, but for racing machines it is at the present time unequalled.

The "Glenn Martin Wing No. 2" is thick, allowing a far more rugged internal construction than the thinner wings ordinarily used. Part or all of the wing bracing may be built inside the wing, reducing the air resistance of the plane, especially at high speeds.

NIGHT SERVICE ACROSS CHANNEL

Night flying between England and the continent will be an assured fact in the near future, according to announcement by Major-Gen. Sir F. H. Sykes, controller-general of civil aviation in England. Experiments already successfully carried out and rapid progress now going on in perfecting night landing devices forecast the day when regular night cross-channel passenger service will be an integral part of the aerial transport system.

Experimental lighthouses at Croydon, one of the chief London aerial termini for London-Paris services, have been a success and additional ones are being installed as rapidly as possible along the route.

Powerful searchlights will also be used to assist pilots in landing. The innovation presages the time when London and Paris business men will be classed as air commuters, being able to return to their homes in either city in a few hours after their day's work.

It is hoped, according to Gen. Sykes, that the danger from fogs will be minimized by the use of lights, thus eliminating one of the worst dangers of flying.

THERE IS MONEY IN FLYING

Frequently aviators have made upwards of \$1,000 per day in passenger carrying at amusement parks, seashore resorts or summer hotels. From this it is easy to figure how quickly these boats will pay for themselves in operation, and how soon they will start in to build a permanent and very considerable income for the foresighted individuals who go into this business at this time.

AERIAL SERVICE TO PEACE RIVER OIL FIELDS

New York.—If you want to get to Moose Factory with neatness and despatch, the flying boat is far better than the balloon or the dog-sled as a vehicle. So says F. G. Ericson, formerly of the Imperial Munitions Board, and now head of a Toronto aircraft firm. Speaking recently at a luncheon given in his honor at the Hotel Astor, New York, Mr. Ericson made a strong case for the flying boat as a means of travel in the Northland.

In the spring he is to open a commercial flying service between Great Slave Lake and Fort Norman in the Mackenzie basin. In his talk Mr. Ericson described frequent flights from Cochrane to Moose Factory, each taking less than two hours, as against weeks by dog team or canoe, the native methods of travelling.

The Great Slave Lake to Fort Norman air service, he said, would be opened in May, and would be continued from six to eight months in each year. The flight from Great Slave Lake to the Mackenzie oil fields would be made in 24 hours.

FLYING BOATS LOCATE FISH

E. G. Diess, Sales Manager of the Syd Chaplin Aircraft Corporation, of Los Angeles, worked ten months persuading cannery men to equip their fishing fleets with flying boats. Finally after a demonstration, Curtiss flying boats were purchased. The flying boats soar out over the waters of Southern California and locate schools of tuna and albacore, saving considerable time for the fleet, which otherwise would have to spend hours locating the fish. There has been a remarkable increase in the catch this season.

WORLD'S LARGEST DIRIGIBLE BEING COMPLETED

The giant rigid dirigible airship, the R-38, which the British Air Ministry is building for the United States Navy, is 60 per cent. finished, according to late reports. It will be ready for its trial flight sometime in November, it is believed. The R-38 is 694 feet long, contains 2,724,000 cubic feet of gas, has six engines aggregating 1,950 horsepower, driving the great ship through the air at a speed of more than 75 miles an hour. It is planned to fly the R-38 to America early next spring.

ENGINE COMPARTMENT FIRE EXTINGUISHER

Capt. W. A. Ross of War-Inc. of Washington, D.C., demonstrated his fire-fighting apparatus for aeroplanes recently. He set an engine on fire and in six seconds the fire was out. He uses a system of sprinklers using carbon tetrachloride. As soon as fire breaks out the pilot opens a valve and between the V in the engine and on both sides this chemical pours out, so that the fire is quickly extinguished.

WANTS AN AEROPLANE TO CARRY "DRY" RAIDERS

Chicago.—Frank D. Richardson, prohibition director for this district, said that he was sending an appeal to Washington for an army aeroplane for use in surprise raids on towns like Hurley, Wis., in which the prohibition law had been broken. "Dry" agents who entered Hurley found the news of their coming had preceded them.

Design of Commercial Aeroplanes

By E. W. STEDMAN, of the Air Board.

When the war started aeroplane design was in its infancy and organized research only just beginning to develop. The struggle for supremacy in the air during the war made it necessary that research should be put to one side in favor of the immediate problems that arose on the design of war aeroplanes.

The aeroplane so developed showed wonderful increases in performance and range but usually at the expense of first cost and operating expense, due to the enormous horse-powers utilized. At the end of the war there was a surplus of war machines which were available for commercial purposes and a number of companies opened up commercial routes, using these machines. The experience of the last two years has shown that only in exceptional cases can these war aeroplanes be made to pay on commercial work, and that new machines especially designed for commercial work are necessary.

It is intended that this paper should give an indication of one of the factors that tend toward the design of aeroplanes that can be operated at a profit.

As an example of a standard type of machine it is proposed to consider the following case:

LONG DISTANCE PHOTOGRAPHIC PATROL (COMMERCIAL)

In this case it is desired to carry a load of 1,000 pounds, including the pilot, controls, photographer and camera and to have a duration of eight hours at full power.

Every designer will have figures available giving the average weight for engines, radiators, etc. These figures will be approximately along the lines given below:

Engine.....	2.5 lbs. per h.p.
Radiator and water.....	0.65 lbs. per h.p.
Fuel and oil.....	0.55 lbs. per h.p. hour
Tanks.....	0.12 of fuel weight
Propeller.....	0.33 lbs. per h.p.
Structure weight.....	0.35 of total weight

From these figures we have: Total weight=Structure + Engine+Radiator+Propeller, Fuel and Tanks load.

And from the case given above—

$$0.65 W = 8.41 \text{ h.p.} + 1000$$

$$W = 12.94 \text{ h.p.} + 1540 \text{ lbs.} \quad (1)$$

From this equation plot a line giving total weight of the aeroplane on a horse-power base and also draw lines to indicate weight per h.p. of 14 lbs., 16 lbs., 18 lbs., etc.

* * *

In cases where there is a very large change in the total weight it may be necessary to reconsider the figure assumed for the structure weight of the aeroplane, as the structure weight varies slightly with the size of the machine.

COSTS

The cost of operating an aeroplane can be divided into two parts, the initial cost and the running cost. The initial cost depends almost entirely upon the total weight of the machine and upon the horse-power of the engine.

The running cost depends upon the cost of fuel and oil, the cost of spare parts and labor cost. The amount of fuel and oil depends almost directly on the horse-power of the engine and inversely as the speed. In the case considered the speed has been slightly reduced so that the running time for the given journey is increased by about

6 per cent., whereas the horse-power has been reduced 50 per cent., showing a very considerable saving in the cost of fuel and oil. The cost of spare parts depends upon the initial cost, which in turn depends entirely on the total weight of the machine and the horse-power of the engine. The cost of labor depends very largely upon the total weight of the machine and the size of the engine, with the consequence that with a small machine labor can be very largely reduced.

The points brought out above indicate the importance of considering any new design from a point of view of costs. In many cases the performance given by machines loaded to 19 lbs. per horse-power would be all that was required, but in other cases it might pay to have a higher performance machine.

In all cases it is necessary to choose the loading so that the machine will have sufficient power reserve for getting off the ground in the type of country over which it is to operate and overloading should not be allowed to interfere with safety, the main point to be brought out is that in endeavoring to obtain an extra few miles an hour on top speed, it is easily possible to make an aeroplane that is too expensive to operate at a profit.

IMPORTANCE OF RESEARCH

The general trend of research in design and aerodynamics will be to increase the performances of a machine for any given value of the horse-power loading. This will also cause a tendency to reduce the total horse-power and weight of any machine built to a particular specification, thus reducing the costs. It is essential, therefore, to progress in commercial aviation that research work in aerodynamics and also in design of aircraft should be given every possible assistance.

RETURNED AIRMEN'S INSURANCE

A scheme which is of vital importance to the personnel of the Canadian Air Force and which should be most carefully investigated by those of us who have the welfare of our dependents at heart, is the government insurance provided for all persons who served during the Great War, under which is known as the Returned Soldiers' Insurance Act.

This act makes available to any person who served with the forces during the war life insurance on the "straight life" plan at a cost which is appreciably lower than the cost of similar insurance elsewhere. Of particular importance to flying men is the fact that the policies have no restrictions with regard to occupation, including military, naval or air service.

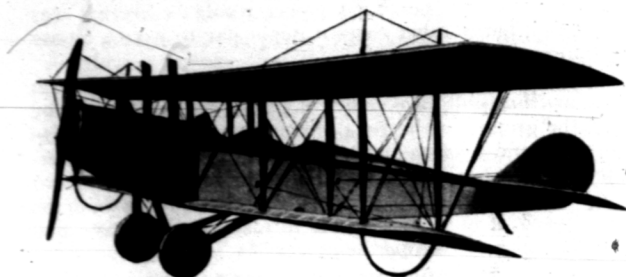
In order to obtain this insurance medical examination is not required. All that is necessary is to fill in a simple application form and send it in to the head office of the commission which is administering the scheme, together with the amount of the first premium. It is also to be noted that the premiums may be paid monthly if that plan is more suitable without any additional charge.

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Just now every motor boat owner is concerned with the question of fitting out for the coming season, and the smell of paint and varnish begins to pervade yachting centres, while the sound of the scraper is heard in the land.

For the sake of economy, some owners will elect to do the work themselves, but even if this course is not adopted, it is advisable for the man who foots the bill to have a good general idea of what work is involved and where savings can be effected.

Where to Start

What should be the first operation depends upon whether the engine is removed or left in position. In the former case, a start can be made at once on the inside of the hull. Dirt and grease should have been removed by soap and water in the autumn, but no scraping or sand-papering was then undertaken. If the painted surfaces have been coated with high-class enamel, it is quite possible that they will be good enough for several seasons. On the other hand, should the paintwork be rough, it might be run over with a scraper to take off the lumps and afterwards rubbed down with sandpaper. In these operations work should be started at the top and proceed downwards. In extreme cases, where the paintwork is blistered badly, it may be necessary to burn it off, the surfaces being afterwards smoothed down with sandpaper.

Inside Work

Inside varnished work may or may not be good enough for another season. If several years have elapsed since the surfaces were scraped down to the bare wood, this operation must be carried out again; but should the work be fairly bright, a scrub with soap and water, followed by sandpapering and a new coat of varnish, will give it almost as good an appearance as if the former procedure had been carried out. Supposing that it be decided to scrape off the old varnish, the work is much more easily

done with the help of a "remover." The latter can be purchased at any oil store, and if brushed on to the surfaces, will soften the varnish in about ten minutes, when it can be scraped off with far less effort than if tackled in its hard state. It must be remembered, however, that these removers are very inflammable, consequently smoking must not be indulged in when using them. After the varnish has been scraped off the surfaces should be well rubbed over with sandpaper. Finally, all dirt and dust should be washed out of the boat and the inside wiped over with a damp cloth, especial care being taken to clear the limber holes.

If the inside work is all varnished, re-coating it is simple enough; but novices should remember that varnish must be brushed about a great deal—in fact, on a dry day, until it becomes tacky. At least three coats will be required on bare wood to give a neat appearance, the first two being rubbed down with sandpaper after they have become hard. Any overhead surfaces, if painted, should be done first of all, but paintwork at the sides or on bulkheads is better dealt with after varnishing. If the old coating has been burnt off, at least two coats of common paint will be required before finishing with enamel, likewise any bare places on paintwork which is good enough for another season should be given two coats of common paint before the enamel. All parts under the floors should be given at least two coats of red oxide, any ballast being also coated with this paint. Alternatively the bilges and ballast may be coated with black varnish, which is distinctly advantageous for old craft. The engine should be put back into position, and lined up after the bilges have been done, but before the paint and varnish work is undertaken.

The Engines

Supposing the engine has been left in the boat, it should be overhauled before any of the other work is done. How far this process should extend depends upon the amount of use the engine has been put to during the



season. The marine motor which is only run at week-ends during a short season, and for perhaps a fortnight extra, when the owner is taking his holidays, should not require a complete overhaul every year; but, of course, all parts must be thoroughly cleaned, and the crankcase should be washed out with petrol or paraffin. It is advisable also to remove the pistons to find out if the rings are in good order, and the valves must be taken out and ground in, if necessary.

Water jackets should receive special attention, plugs or covers being removed, and any deposits washed out. Vaporizers of paraffin engines will also require cleaning, and the exhaust piping and silencer. Tanks and piping should be tested for leakage, and glands for stern tubes and pumps will require repacking. Operations of this description should be quite within the capabilities of the amateur, but the taking up and re-bedding of crankpin and main bearing brasses is a very difficult operation, which requires great skill if the subsequent working is to prove satisfactory. The main objects of the amateur should be to clean all parts thoroughly and replace any that are broken or missing. Finally, the electrical gear should be put back in position, great care being taken to connect it up correctly. If the engine has been removed for the winter, it now requires lining up with the propeller shaft, always supposing that no universal joint is interposed between the two. This operation again requires considerable skill, and unless the amateur has had some experience, he will be well advised to call in the assistance of a professional mechanic. If possible, the propeller shaft should be drawn and the condition of the outer bearing noted, as rapid wear often takes place at this point. If a new bush is required it should be fitted before the engine is lined up with the propeller shaft.

If the engine is in position in the boat when the scraping and cleaning operations inside are in progress, it must be very carefully covered to exclude all dust and debris.

Outside Work

We now come to the work to be done on deck, topsides, and the bottom, together with the renovating of the masts, spars and sailing gear, if these accessories are carried. If the boat is laid up in a shed the work can go on at any time, but should it be outside, which is sometimes the case, operations must be suspended in bad weather. It is advisable, therefore, to proceed with the fitting out inside and outside at the same time, the latter being carried on when the weather is favorable. For outside work, as for inside, a beginning should be made at the top, the mast being tackled first of all. If the mast and spars have been laid up under shelter and were scraped and varnished at the beginning of the previous season, it is quite possible that a scrub with soap and water, followed by a coat of varnish, will make them look as good as new. Should they be discoloured, however, it will be necessary to scrape off the old varnish completely.

How to Sharpen a Scraper

At this point a word or two may be said on the question of scrapers. The latter are usually three-cornered or heart-shaped, and they are made of soft steel, which can be filed, a three-cornered saw file being generally used for this purpose. One side of the scraper is bevelled, while that towards the handle is flat. When dull, the bevelled edges should be filed to an angle of about 45 degrees, and

each edge should be slightly convex. After filing, a hard steel tool, such as a bradawl, should be passed along the edges at a bigger angle than they are filed to, so that only the sharp edge is touched. The tool must be pressed heavily on the edges during this process. It is finished off by passing the tool along the edges on the flat side of the scraper almost parallel with the surface. It is not necessary to file a scraper every time it becomes dull, the tool passed over the edges again being quite sufficient to sharpen it twice before refiling.

Sandpapering is irksome work at the best, but it can be more effectively done if the sandpaper is doubled round a pad, such as a rectangular piece of wood or cork.

Masts and Spars

With regard to the masts and spars, it is often much easier to plane than to scrape them, whilst the former operation brings down the knots to the same level as the rest of the surface. Planing also makes a much smoother surface, which requires far less sandpapering, and it is doubtful also whether it takes any more off than the scraper.

All blocks should be scraped every year, a scraper being used for the outside and a knife blade for the inside. They should be varnished as for other varnish work, a very liberal supply being brushed on inside so that it will soak in between the metalwork and the wood. Finally, the pins should be knocked out and well greased with gasoline, even if the sheaves are of the roller type.

The scraping, varnishing and painting of work on deck should be carried out on similar lines as those already described for the inside work. A bright (bare wood) deck should be holy-stoned after the varnish has been removed and before the painting and varnishing is done to other parts. The next operation is the cleaning and painting of the topsides. A good scrub with lye and hot water should precede other operations, that is, unless it be decided to burn off the paint altogether, in which case the procedure is as already described for the inside work. If the topsides are to be simply recoated, all rough places should be scraped smooth, particular care being taken to fine down the edges of all blisters, both by scraping and sandpapering, otherwise these will show through.

Anti-fouling Compositions

Finally, the bottom is coated with anti-fouling composition after all rough places have been smoothed down. If the bottom was black varnished when the boat was laid up, the anti-fouling composition must be put over this, but on no account should a new coat of black varnish be laid on, as it will come through the composition and largely counteract its anti-fouling qualities. Even the old varnish put on six months before will have a bad effect, and better results are obtained if a coat of red oxide is given before the composition is laid on. The latter should be well brushed into any cracks or holes which have not been filled, as barnacles and weeds will get hold of any bare surfaces. Many owners have their own pet brand of anti-fouling composition, which they swear by to the exclusion of all others. It is unwise, therefore, to make any suggestions as to the brand to be used. One important point to be remembered, however, with all brands, is that the composition should be constantly stirred whilst being laid on; in fact, the best results are obtained when a boy is kept stirring all the time.

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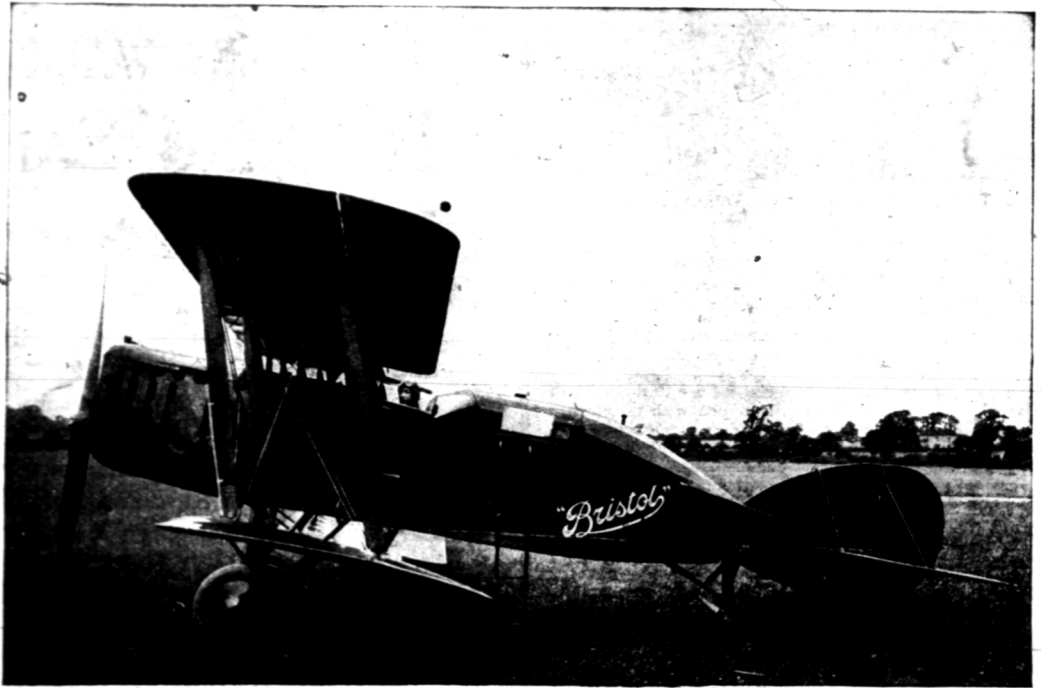
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